

Applicant(s): P. Bonutti
Application No.: 10/007,360
Examiner: E. Robert

Amendments to the Claims

1. (Previously presented) A method of securing a first bone against movement relative to a second bone in a patient's body, said method comprising the steps of:
positioning a retainer member formed of bone through the first bone and into the second bone;
preventing relative movement between the first and second bones with the retainer member for a period of time; and
thereafter, breaking the retainer member to release the first and second bones for movement relative to each other, wherein the retainer member is broken in a joint space located between the first and second bones.

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2.-4. (Cancelled)

5. (Previously presented) A method as set forth in claim 1 further comprising utilizing the retainer member to form an opening in the first or second bone in the patient's body by moving at least a portion of the retainer member through a compact outer layer of the first or second bone into cancellous bone enclosed by the compact outer layer.

6. (Previously presented) A method as set forth in claim 1 further comprising connecting the retainer member formed of bone with the second bone by moving a portion of the retainer member formed of bone into the second bone and transmitting force between an outer side surface area on the retainer member formed of bone and the second bone.

7. (Previously presented) A method as set forth in claim 1 further comprising connecting the retainer member formed of bone with first bone by moving a portion of the retainer member through a portion of the first bone and transmitting force between an outer side surface area on the retainer member formed of bone and the first bone.

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8.-15. (Cancelled)

16. (Previously presented) A method as set forth in claim 1 wherein said step positioning the retainer member formed of bone through the first bone and into the second bone includes moving a leading end portion of the retainer member formed of bone through the first bone and into the second bone and interrupting movement of the retainer member formed of bone when the leading end portion of the retainer member formed of bone has moved a predetermined distance into the second bone disposed in the patient's body.

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17.-21. (Cancelled)

22. (Withdrawn) A method as set forth in claim 1 wherein said step of positioning the retainer member formed of bone through the first bone and into the second bone includes moving a thin elongated member through the first bone and into the second bone, and guiding movement of the retainer member formed of bone through the first bone and into the second bone with the thin elongated member.

23.-27. (Cancelled)

28. (Withdrawn) A method as set forth in claim 1 wherein said step of positioning a retainer member formed of bone through the first bone and into the second bone includes enclosing the retainer member formed of bone with a sleeve, applying force against a trailing end portion of the retainer member formed of bone, and moving a leading end portion of the retainer member formed of bone through the first bone and into the second bone under the influence of force applied against the trailing end portion of the retainer member formed of bone while the retainer member formed of bone is enclosed by the sleeve.

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29. (Withdrawn) A method as set forth in claim 28 further including the step of interrupting movement of the leading end portion of the retainer member formed of bone through the first bone and into the second bone when the leading end portion of the retainer member formed of bone has moved a predetermined distance through the first bone and into the second bone.

30.-45. (Cancelled)

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46. (Previously presented) A method of securing a first bone in a patient's body against movement relative to a second bone in the patient's body, said method comprising the steps of moving a retainer member into the first and second bones, retaining the first and second bones against movement relative to each other with the retainer member, and, thereafter, breaking the retainer member to release the first and second bones for movement relative to each other, wherein the retainer member is broken in a joint space located between the first and second bones.

47. (Original) A method as set forth in claim 46 wherein the retainer member is formed of bone, said step of moving the retainer member into the first and second bones includes utilizing the retainer member formed of bone to at least partially form an opening in at least one of the bones.

48. (Original) A method as set forth in claim 46 wherein said step of breaking the retainer member to release the first and second bones for movement relative to each other includes bending a joint between the first and second bones.

49. (Original) A method as set forth in claim 46 wherein said step of moving the retainer member into the first and second bones includes utilizing the retainer member to form an opening extending through the first bone and to form an opening extending into the second bone.

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50. (Original) A method as set forth in claim 46 wherein said step of moving the retainer member into the first and second bones includes moving the retainer member through connective tissue disposed between the first and second bones.

51. (Original) A method as set forth in claim 46 wherein an end portion of the first bone is disposed adjacent to an end portion of the second bone, said step of moving the retainer member into the first and second bones includes moving a portion of the retainer member through the end portion of the first bone into the end portion of the second bone.

52.-63. (Cancelled)

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64. (Previously presented) A method as set forth in claim 49 further including the step of removing a hard surface area from a location on a compact outer layer of at least one of the first and second bone in the patient's body, said step of utilizing the retainer member to form an opening includes transmitting force from the leading end portion of the retainer member at the location where the hard surface area on the compact outer layer was removed.

65. (Previously presented) A method as set forth in claim 46 further comprising connecting the retainer member with the first and second bones by transmitting force between an outer side surface area on the retainer member and the first and second bones.

66.-68. (Cancelled)

69. (Withdrawn) A method as set forth in claim 47 wherein said step of utilizing the retainer member formed of bone to at least partially form an opening in at least one of the bones includes enclosing the retainer member formed of bone with a sleeve, and applying force against a trailing end portion of said retainer member formed of bone to move a leading end portion of

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the retainer member formed of bone through the first bone and into the second bone in the patient's body.

70.-73. (Cancelled)

74. (Currently Amended) A method of immobilizing a joint between first and second bones in a patient's body, said method comprising the steps of:

moving a retainer member formed of bone through a portion of the first bone and into the second bone, and

holding the first and second bones against movement relative to each other with the retainer member formed of bone, wherein the first and second bones are different bones in the patient's body, and

releasing the first and second bones for movement relative to each other by breaking the retainer member formed of bone.

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75. (Original) A method as set forth in claim 74 wherein said step of moving a retainer member formed of bone through a portion of the first bone and into the second bone includes utilizing the retainer member formed of bone to form an opening in the second bone as the retainer member formed of bone moves into the second bone.

76. (Cancelled).

77. (Currently Amended) A method as set forth in claim 74 of immobilizing a joint between first and second bones in a patient's body, said method comprising the steps of:

moving a retainer member formed of bone through a portion of the first bone and into the second bone;

holding the first and second bones against movement relative to each other with the retainer member formed of bone, wherein the first and second bones are different bones in the

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patient's body, and

~~further including the step of~~ positioning tissue at the joint between the first and second bones prior to performing said step of moving a retainer member formed of bone through a portion of the first bone and into the second bone.

78. (Original) A method as set forth in claim 74 further including the step of determining the extent of movement of a leading end portion of the retainer member formed of bone relative to the first bone and interrupting said step of moving the retainer member formed of bone through a portion of the first bone and into the second bone upon determining that the extent of movement of the leading end portion of the retainer member formed of bone corresponds to a predetermined extent of movement.

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79. (Withdrawn) A method as set forth in claim 74 further including the step of inserting the retainer member formed of bone into a tubular member, and positioning the tubular member adjacent to the first bone, said step of moving a retainer member formed of bone through a portion of the first bone and into the second bone is at least partially performed with a portion of the retainer member formed of bone disposed in the tubular member.

80. (Withdrawn) A method as set forth in claim 79 wherein said step of moving a retainer member formed of bone through a portion of the first bone and into the second bone includes applying force against a trailing end portion of the retainer member formed of bone while the trailing end portion of the retainer member formed of bone is enclosed by the tubular member.

81. (Withdrawn) A method as set forth in claim 74 wherein said step of moving a retainer member formed of bone through a portion of the first bone and into the second bone includes moving a thin elongated member into the portion of the first bone and into the second bone in the patient's body and moving the retainer member formed of bone along the thin

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elongated member into the portion of the first bone and into the second bone in the patient's body.

82. (Withdrawn) A method as set forth in claim 81 wherein said step of moving the retainer member formed of bone along the thin elongated member into the portion of the first bone in the patient's body includes utilizing the retainer member formed of bone to form an opening in the portion of the first bone and the second bone in the patient's body.

83. (Withdrawn) A method as set forth in claim 82 wherein said step of positioning the retainer member formed of bone in the portion of the first bone in the patient's body includes the steps of enclosing the retainer formed of bone with a tubular member disposed adjacent to an outer side of the portion of the first bone in the patient's body, and applying force against a trailing end portion of the retainer member formed of bone.

84. (Withdrawn) A method as set forth in claim 81 wherein said step of connecting the retainer member formed of bone with the tissue to be secured includes moving the retainer member formed of bone through the tissue.

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85. (Cancelled)

86. (Withdrawn) A method as set forth in claim 81 further including the step of removing a hard surface area from a location on the portion of the first bone in the patient's body, said step of moving a thin elongated member into the portion of the first bone in the patient's body includes moving the thin elongated member into the portion of the first bone in the patient's body at the location where the hard surface area on the portion of the first bone in the patient's body was removed, said step of moving the retainer member formed of bone along the thin elongated member includes moving a leading end portion of the retainer member formed of bone into engagement with the portion of the first bone in the patient's body at the location where the

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hard surface area on the portion of the first bone in the patient's body was removed.

87. (Withdrawn) A method as set forth in claim 81 wherein said step of moving the retainer member formed of bone along the thin elongated member includes utilizing the retainer member formed of bone to form an opening in the portion of the first bone in the patient's body by pushing material forming the portion of the bone in the patient's body aside under the influence of force transmitted through the retainer member formed of bone.

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88.-100. (Cancelled)

101. (Withdrawn) A method as set forth in claim 1 further comprising the steps of positioning at least a portion of a retainer member formed of bone in a tubular member, and moving at least a portion of the retainer member formed of bone out of the tubular member through the first bone and into the second bone in the patient's body.

102. (Withdrawn) A method as set forth in claim 101 wherein said step of moving at least a portion of the retainer member formed of bone out of the tubular member through the first bone and into the second bone in the patient's body includes forming an opening in the first bone in the patient's body with a leading end portion of the retainer member formed of bone.

103. (Withdrawn) A method as set forth in claim 101 wherein said step of moving at least a portion of the retainer member formed of bone out of the tubular member through the first bone and into the second bone in the patient's body includes initiating formation of an opening in the first bone in the patient's body.

104. (Withdrawn) A method as set forth in claim 101 further including the step of removing a hard surface area from a location on at least one of the first and second bones, said step of moving at least a portion of the retainer member formed of bone through the first bone and into the second bone includes transmitting force from an end portion of the retainer member

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formed of bone at the location where the hard surface area was removed.

105. (Withdrawn) A method as set forth in claim 101 wherein said step of moving at least a portion of the retainer member formed of bone through the first bone and into the second bone includes rotating the retainer member formed of bone about a central axis of the retainer member formed of bone.

106. (Withdrawn) A method as set forth in claim 101 wherein said step of moving at least a portion of the retainer member formed of bone through the first bone and into the second bone includes applying an axially directed force against the retainer member formed of bone and pushing material of at least one of the first and second bones in the patient's body aside under the influence of the axially directed force without rotating the retainer member formed bone about a central axis of the retainer member formed of bone.

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107. (Withdrawn) A method as set forth in claim 101 wherein said step of moving at least a portion of the retainer member formed of bone through the first bone and into the second bone in the patient's body includes moving at least a portion of the bone in the patient's body into cancellous bone enclosed by the compact outer layer.

108. (Withdrawn) A method as set forth in claim 101 wherein said steps of moving at least a portion of the retainer member formed of bone out of the tubular member through the first bone and into the second bone in the patient's body includes connecting the retainer member formed of bone with the first and second bones by moving a portion of the retainer member formed of bone through the first bone and into the second bone in the patient's body and transmitting force between an outer side surface area on the retainer member formed of bone and the first and second bones.

109.- 115. (Cancelled)

116. (Withdrawn) A method as set forth in claim 101 wherein said step of moving at least a portion of the retainer member formed of bone out of the tubular member through the first

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bone and into the second bone in the patient's body includes moving a leading end portion of the retainer member formed of bone through the first bone and into the second bone in the patient's body and interrupting movement of the retainer member when the leading end portion of the retainer member formed of bone has moved a predetermined distance into through the first bone and into the second bone in the patient's body.

117. (Withdrawn) A method as set forth in claim 101 wherein said step of moving at least a portion of the retainer member formed of bone out of the tubular member through the first bone and into the second bone in the patient's body includes moving a thin elongated member through the first bone and into the second bone in the patient's body and guiding movement of the retainer member formed of bone through the first bone and into the second bone in the patient's body with the thin elongated member.

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118. (Cancelled)

119. (Withdrawn) A method as set forth in claim 101 further including the step of disengaging the tubular member from the retainer member formed of bone after performing said step of moving at least a portion of the retainer member formed of bone through the first bone and into the second bone in the patient's body.

120.-128. (Cancelled).

129. (Previously presented) A method of securing a first bone against movement relative to a second bone in a patient's body, said method comprising the steps of initiating formation of an opening in the first bone in the patient's body by applying force against the first bone in the patient's body with an end of a retainer member formed of bone, moving at least a portion of the retainer member formed of bone into the opening initiated in the first bone in the patient's body by the retainer member formed of bone, connecting the retainer member formed of bone with the tissue to be secured, wherein the tissue to be secured is a second bone in the patient's body, said steps of moving at least a portion of the retainer member formed of bone in

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the first bone in the patient's body and connecting the retainer member formed of bone with the tissue to be secured includes moving a portion of the retainer member through the first bone into the second bone to prevent relative movement between the first and second bones, and thereafter, breaking the retainer member to release the first and second bones for movement relative to each other, wherein the retainer member is broken in a joint space located between the first and second bones.

130. (Previously presented) A method as set forth in claim 129 further including the step of removing a hard surface area from a location on the first bone in the patient's body, said step of initiating formation of an opening in the first bone in the patient's body includes transmitting force from the end of the retainer member formed of bone to the first bone in the patient's body at the location where the hard surface area was removed.

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131. (Previously presented) A method as set forth in claim 130 wherein said step of transmitting force from the end of the retainer member formed of bone to the first bone in the patient's body includes rotating the retainer member formed of bone about a central axis of the retainer member formed of bone.

132. (Previously presented) A method as set forth in claim 130 wherein said step of transmitting force from the end of the retainer member formed of bone to the first bone in the patient's body includes pushing material of the first bone in the patient's body aside under the influence of force transmitted from the retainer member formed of bone.

133. (Previously presented) A method as set forth in claim 129 wherein said step of moving at least a portion of the retainer member formed of bone into the first bone in the patient's body is performed without rotating the retainer member formed of bone about a longitudinal central axis of the retainer member formed of bone.

134. (Previously presented) A method as set forth in claim 129 wherein said step of connecting the retainer member formed of bone with tissue to be secured includes moving a

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portion of the retainer member formed of bone into the tissue to be secured and transmitting force between an outer side surface area on the retainer member formed of bone and the tissue to be secured.

135. (Previously presented) A method as set forth in claim 129 wherein said step moving at least a portion of the retainer member formed of bone into the opening initiated in the portion of the bone in the patient's body by the retainer member formed of bone includes moving a leading end portion of the retainer member formed of bone into the portion of the bone in the patient's body and interrupting movement of the retainer member formed of bone into the portion of the bone in the patient's body when the leading end portion of the retainer member formed of bone has moved a predetermined distance into the portion of the bone disposed in the patient's body.

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136.-137. (Cancelled)

138. (Previously presented) A method as set forth in claim 129 wherein said step of connecting the retainer member formed of bone with the tissue to be secured is performed after performance of said step of initiating formation of an opening in the first bone in the patient's body.

139. (Previously presented) A method as set forth in claim 50, wherein the connective tissue is healed prior to breaking the retainer member.